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Use of Low-Dose Ketamine for Pain Management in an Emergency Department

Joseph Ladd

Homestead Hospital, josephl@baptisthealth.net

Winifred Pardo

Homestead Hospital, wpardo@baptisthealth.net

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INTRODUCTION

- ▶ In the emergency department (ED) many barriers exist to pain management, including its subjective nature, regulatory issues, knowledge deficits, and fear concerning therapy.
- ▶ NSAIDs and acetaminophen often cannot provide enough relief. Opioids have significant adverse effect profiles and are hindered by side effects, dependency, and tolerance.
 - The Joint Commission highlighted issues with opioid prescribing and related adverse events in a 2012 Sentinel Event Alert.
 - The American College of Emergency Physicians has instituted efforts to reduce unnecessary and improper opioid prescribing.
- ▶ A non-competitive NMDA receptor antagonist with properties that allow for little respiratory depression, ketamine has historically been used for sedation and anesthesia in settings with limited resources.
- ▶ Ketamine’s unique safety profile in the anesthetic setting and variety of dosage forms indicate its potential role in pain management.

PURPOSE

To assess the safety and efficacy of using low-dose ketamine (LDK) for pain management. Data will be used to evaluate the use of ketamine in treating mild-to-severe pain in a high-volume community hospital emergency department, and to recommend a dosing guideline for its use in the ED.

METHODS

Study Design: An observational study utilizing retrospective medical chart reviews of a sample of patients who received low-dose ketamine during a visit to the Emergency Department at Homestead Hospital.

Sample Size: 24 subjects.

Inclusion Criteria: Admission to the Homestead Hospital ED for treatment of acute or chronic mild, moderate, or severe pain with ketamine between June 2014 and June 2015.

Exclusion Criteria: Administration of ≥ 1 mg/kg of ketamine.

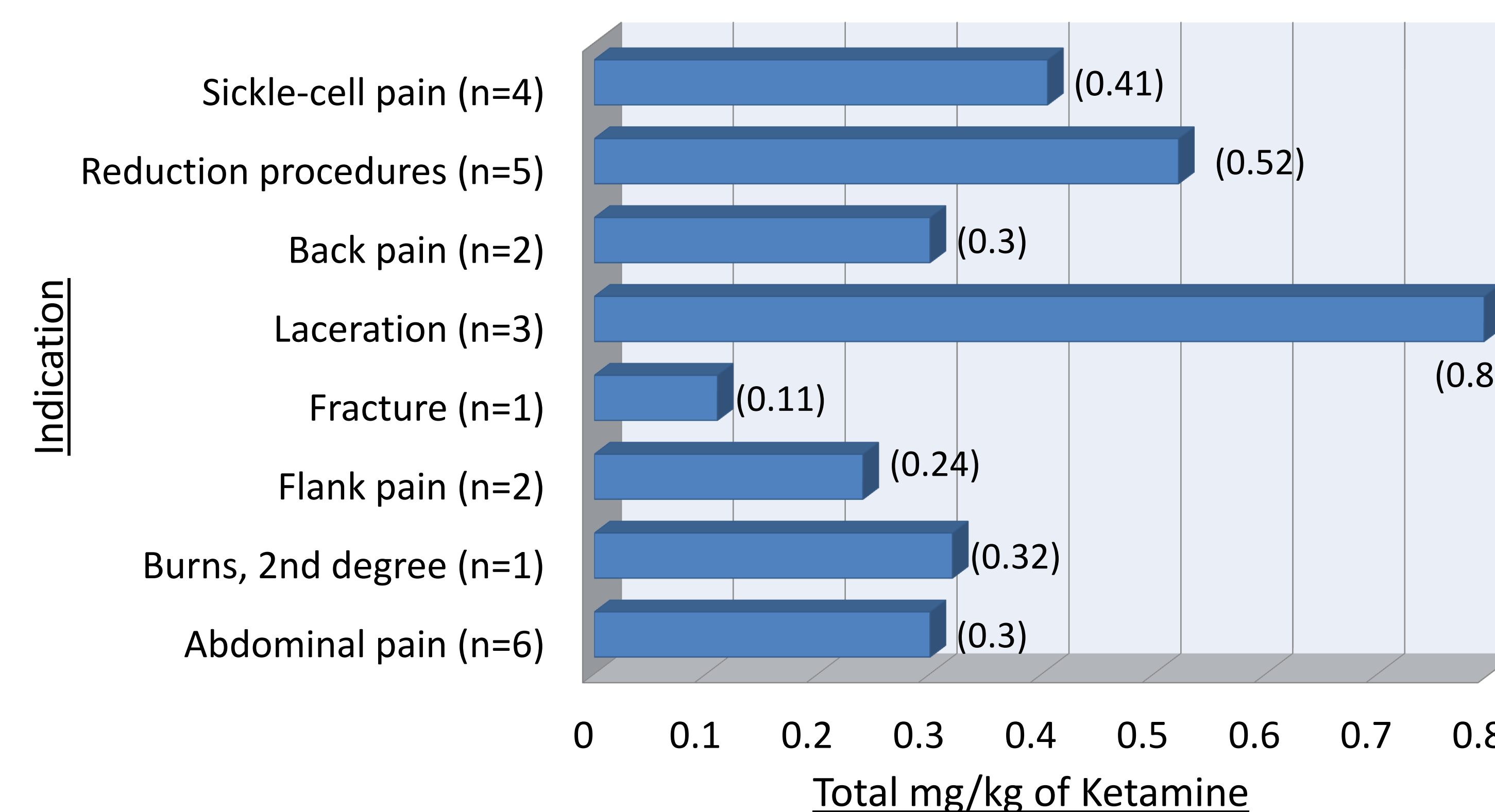
Instruments: The Wong-Baker FACES Pain Rating Scale for children, a 1-10 Visual Analogue Scale for adults, and provider documentation.

Procedures: A retroactive computerized report was generated to identify all patients who received ketamine in the ED between June 2014 and June 2015. Any patients who did not fit the study criteria were excluded. Subjects’ profiles were then reviewed by a pre-specified investigator to determine how LDK was used to treat patients’ pain symptoms. Safety and effectiveness were assessed by the incidence of adverse events and changes in subjectively reported pain-rating scores, respectfully.

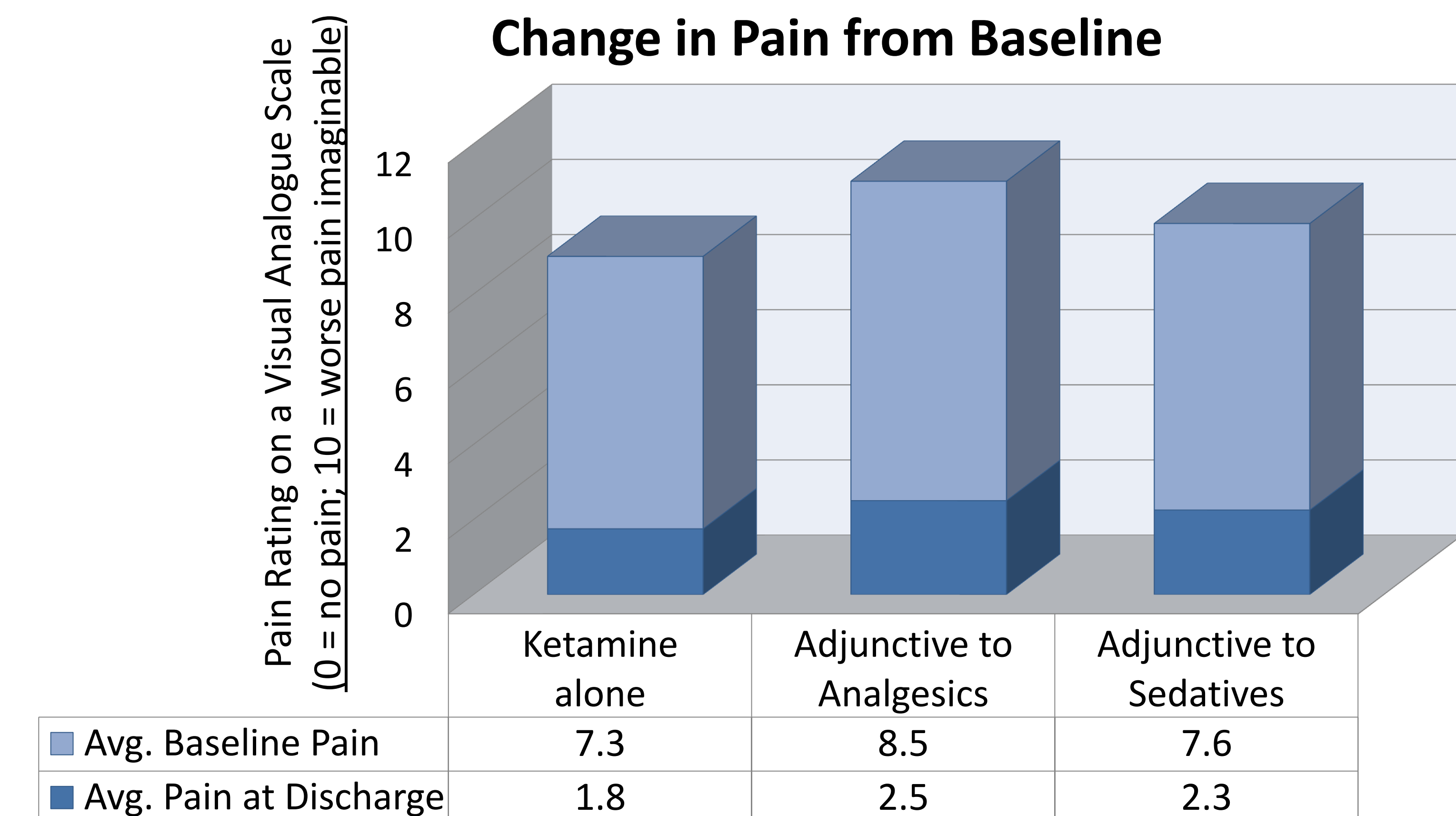
Statistical Analysis: Descriptive statistics were generated using Microsoft Office Excel 2007 to assess how LDK was used in the ED, for what indications, the safety profile of the dosage range being used, and the effectiveness of LDK in reducing pain.

RESULTS

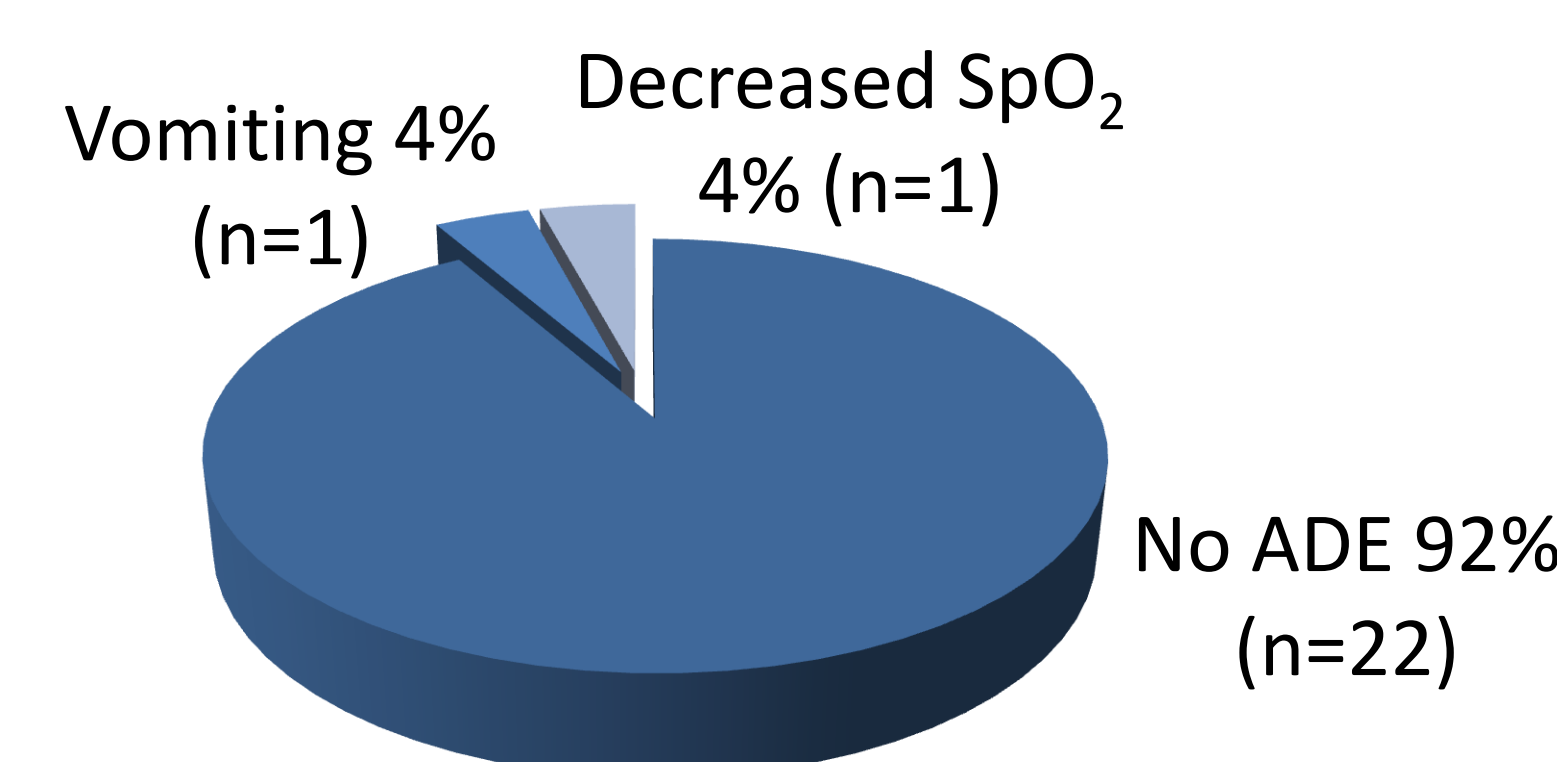
Average Dosing of LDK by Indication



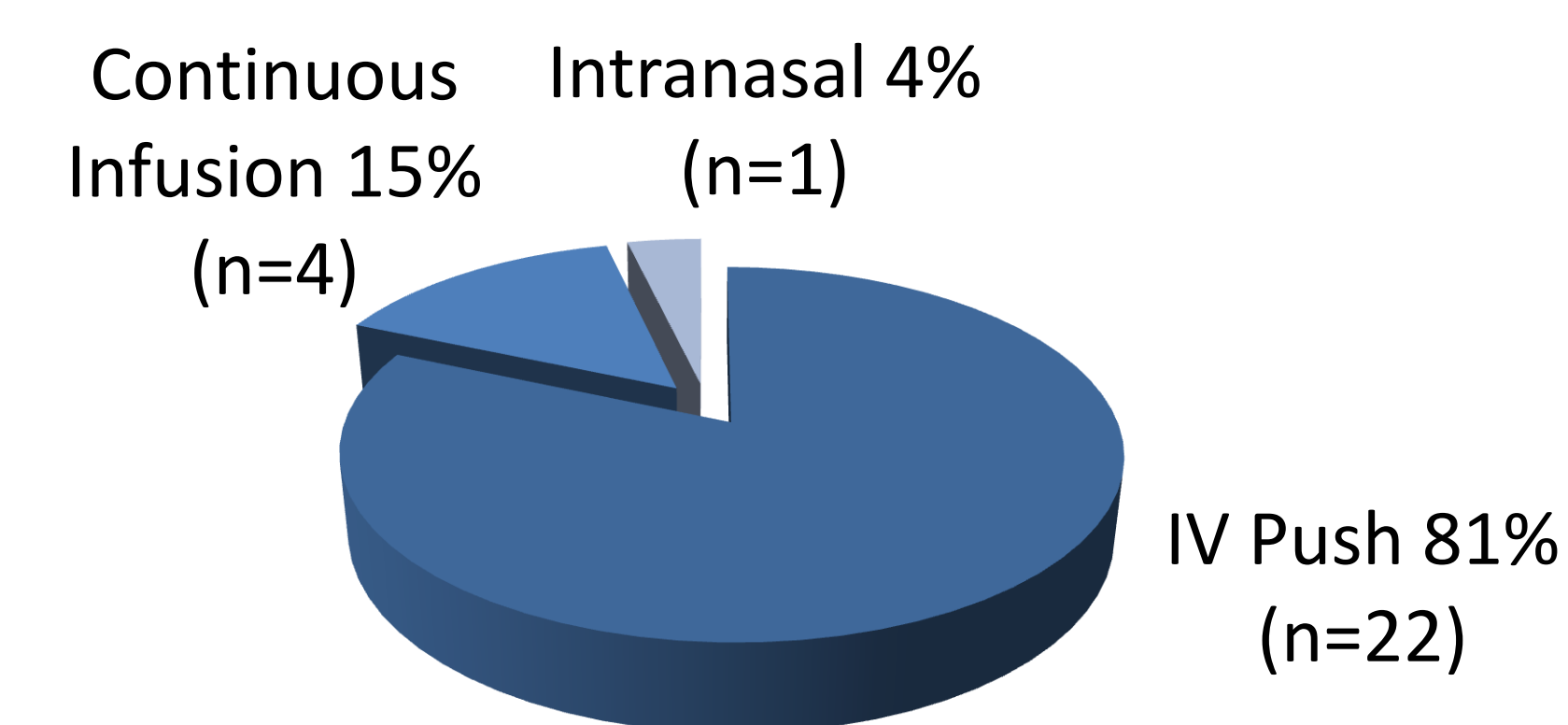
Change in Pain from Baseline



Incidence of Adverse Drug Events



Administration Routes



Coadministered Medications					
None	18%	n=8	Ondansetron	16%	n=7
Atropine	2%	n=1	Opiate analgesics	21%	n=9
Benzodiazepines	5%	n=2	Opiates + APAP	7%	n=3
Diphenhydramine	5%	n=2	Orphenadrine	2%	n=1
NSAIDs	12%	n=5	Propofol	12%	n=5

Patient Demographics (n=24)			
Age (yr), average	34.4	Existing Precautions (%)	25
Weight (kg), average	70.5	Coronary Artery Disease (%)	8.3
Sex		Heart Failure (%)	8.3
Female (%)	54	Hypertension (%)	20.8
Male (%)	46	Baseline Vital Signs	
Baseline Pain Score		Heart Rate (bpm), average	104
Mild (%)	4.3	Systolic Blood Pressure (mmHg), average	129
Moderate (%)	8.7	Diastolic Blood Pressure (mmHg), average	79
Severe (%)	87	Oxygen Saturation (%), average	99
Post-LDK Pain Score		History of Chronic Pain (%)	37.5
None (%)	42.9	History of Opioid Use (%)	37.5
Mild (%)	28.6	Opioid use within the past 24 hours (%)	37.5
Moderate (%)	23.8		
Severe (%)	4.8		

DISCUSSION

- ▶ Of 113 subjects with orders for ketamine, 24 met inclusion criteria.
 - 34 ketamine orders were discontinued prior to administration.
 - 1 patient refused treatment with LDK.
 - 55 subjects received ≥ 1 mg/kg of ketamine.
- ▶ A total average dose of 0.375 mg/kg was administered for eight distinct indications, with the highest doses being used for laceration repair and the lowest for a hairline fracture.
- ▶ Ketamine monotherapy reduced an average baseline pain rating of Severe to Mild upon discharge, in a manner similar to coadministration with analgesics and sedative agents.
- ▶ Common coadministered medications included opioid and non-opioid analgesics, ondansetron, and propofol.
- ▶ Two adverse drug events were reported for separate subjects.
 - Twenty minutes after ketamine administration, a patient vomited yellow bile. Per patient request, ketamine drip was held. Patient was nauseous upon presentation.
 - Three minutes after ketamine administration, oxygen saturation decreased 5% and then returned to baseline after five minutes.

CONCLUSIONS

- ▶ Low-dose ketamine was safely administered to treat a variety of different indications in opioid-naïve and opioid-tolerant patients.
- ▶ Ketamine was effective in doses < 1 mg/kg for providing emergency analgesia in the ED, both as monotherapy and adjunctively.

Disclosure: The authors of this presentation have nothing to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.